ACCESSION #: 9701220222
LICENSEE EVENT REPORT (LER)

FACILITY NAME: James A. FitzPatrick Nuclear Power PAGE: 1 OF 5
Plant

DOCKET NUMBER: 05000333

TITLE: Manual Scram Due to Leak in the Main Turbine Electro-
Hydraulic Control System

EVENT DATE: 12/15/96 LER #: 96-014-00 REPORT DATE: 01/14/97

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 036

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mr. Richard A. Plasse, Jr., TELEPHONE: (315) 349-6793
Senior Licensing Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: TG COMPONENT: SEAL MANUFACTURER:
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:
On 12/15/96 at 0058 with the plant operating at approximately 36 percent power, a manual scram was initiated. At the time of the event the plant was in the process of performing post refuel outage startup/power ascension testing. The manual scram was initiated in anticipation of a potential loss of automatic reactor pressure control due to an identified Electro-Hydraulic Control (EHC) system fluid leak from number 4 turbine bypass valve (29BPV-4) actuator seal. The actuator seal, which was installed during the recently completed refuel outage, was replaced and satisfactorily retested prior to plant restart. Results of an engineering evaluation of the failed seal indicate that the primary actuator seal was most likely damaged during installation.

TEXT PAGE 2 OF 5

EIIS Codes are in []

EVENT DESCRIPTION

On December 15, 1996 at 0058 hours with the plant operating at approximately 36 percent power, a manual scram was initiated. At the time of the event the plant was in the process of performing post refuel outage startup/power ascension testing. The manual scram was initiated by the operating crew in anticipation of a potential loss of automatic reactor pressure control due to an identified Electro-Hydraulic Control (EHC) [JG] system fluid leak from the Number 4 turbine bypass valve (29BPV-4) actuator seal. A non-licensed operator, performing turbine building rounds, identified the EHC leak and informed the Control Room [NA]. A licensed operator and a maintenance engineer dispatched to the scene confirmed the leak. The Shift Manager briefed the Control Room operators on the EHC leak, made operator panel assignments, and directed insertion of a manual scram.

The sequence of events leading up to and immediately following the manual scram is presented below.

December 15, 1996

00:50 (approx.) Maintenance engineer and Senior Nuclear Operator observe EHC fluid leaking from BPV #4 and recommend turbine shutdown.

00:58:55 After Shift Manager announces intent to scram and briefs Control Room operators, Control Room operator inserts manual scram.

00:58:56 Average Power Range Monitors (APRMs) [IG] go downscale and the reactor mode switch placed in shutdown.

00:59 Control Room operator directed to observe RPV pressure response due to low decay heat available to maintain pressure. Operator starts removing steam loads to maintain reactor pressure and control plant cooldown.

00:59 Control Room operator secures EHC system.

00:59 Automatic scram signal on Lo reactor water level.

00:59:08 Group II primary containment isolation.

00:59:23 Reactor water level manually restored to greater than 177".

01:00 Entered EOP-2 due to reactor water level less than 177" TAF.

01:01 All control rods verified full in.

01:03 Main turbine trip/fast transfer verified.

01:03:09 Reactor scram reset.

01:15 Group II primary containment isolation verified complete.

01:27 Exited EOP-2.

02:03 Secured "All reactor feed pump.

04:15 Continued plant cooldown using main steam line drains.

10:54 Placed "B" RHR system in shutdown cooling mode.

12:35 Reactor in the cold condition.

CAUSE OF EVENT

EHC Actuator Seal Leak

Investigation revealed damage to the #4 turbine bypass valve actuator seal. The seal was replaced less than three weeks earlier as part of the 1996 refuel outage scope due to other problems associated with the actuator which were unrelated to this event.

Visual examination revealed damage to the primary seal which provided a leakage path for the high pressure EHC fluid to leak past this seal.

The damage to the primary seal serrations provided a leakage path for the high pressure fluid (approximately 1600 psig). This fluid then collected in the annular space between the primary seal and wiper ring, pressurizing and extruding the wiper ring against its retainer. The wiper ring is designed to keep external foreign material away from the primary seal area, and although it will retain pressure for a short

period of time, it does not have a backup washer and was not designed as a pressure retaining seal. Pressurization of the wiper ring caused extrusion leading to ultimate failure as observed. Inspection confirmed that the wiper ring failed due to material separation allowing EHC fluid to leak. This mode of failure has been confirmed, through discussion and inspection, by the vendor.

The equipment failure evaluation concluded that the primary seal was most likely damaged during installation. A small rough spot of raised metal was identified on the transition step where the rod necks down to the coupling threads. Due to the close clearance (0.004"), the primary seal serrations appear to have been damaged due to physical contact with the raised metal during installation, thus forming a leakage path for fluid to pass. The failure was slow to develop due to the infrequent use of this valve. Turbine bypass valve Number 4 was only operated during stroking for alignment checks, leak checks, and operation during plant startup.

One other actuator seal was replaced during the 1996 refuel outage (29BPV-1) which developed a seal leak after completion of maintenance. Further review during rework determined the cause of the seal failure to be a damaged piston rod which had developed a rough area on the piston where the chrome had thinned. This resulted in accelerated wear on the primary seal where it repeatedly contacted the damaged area of the piston rod. The seal and piston rod were replaced and the valve placed back into service. Based on the cause for 29BPV-1 leakage, it was concluded no recheck of 29BPV-4 was necessary. This conclusion was based on the fact that the recent repair to 29BPV-4 identified no similar damage to the new piston when it was disassembled for maintenance. There was no other seal leakage identified prior to plant startup from the refuel outage until the December 15 event discussed in this LER.

ANALYSIS

Manual Scram

This event is reportable under 10 CFR 50.73 (a) (2) (iv), which requires licensees to report "Any event or condition that resulted in a manual or automatic actuation or any engineered safety feature (ESF), including the reactor protection system (RPS)".

This event is bounded by the previously analyzed main turbine trip with bypass system operation as described in the FitzPatrick Updated Final Safety Analysis Report (UFSAR). The plant responded as designed

following the manual scram from approximately 36 percent of rated power. There was no challenge to the reactor coolant pressure boundary or the fuel cladding integrity. Therefore, the safety significance of this event was minimal.

The Post Transient Review revealed that the Shift Manager prepared for and directed insertion of a manual reactor scram when faced with a potential loss of the EHC system. The operating crew took manual actions to control RPV and primary containment parameters within prescribed limits. Due to the low power level, low decay heat load, size of the EHC leak (approximately 1 to 2 gpm), and conservative decision-making by the Shift Manager, this event resulted in an uncomplicated plant shutdown.

CORRECTIVE ACTIONS

1. The failed actuator seal was repaired and an equipment failure evaluation of the 29BPV-4 actuator seal was completed prior to plant startup.

2. Based on the lessons learned from the failure and to enhance reliability, 29BPV-4 was cycled approximately 45 times prior to plant startup. No leakage was identified.

3. A review of the repair techniques and retest requirements will be performed to enhance long term reliability of all turbine valve actuators. Due Date: 3/31/97

4. Evaluate the need for a modification to provide isolation valves on EHC supply line to turbine valve actuators as a scram frequency reduction initiative. Due Date: 3/31/97

ADDITIONAL INFORMATION

Previous Similar Events: One previous event at FitzPatrick involving EHC system leaks resulted in a manual reactor scram (LER-96-003).

Failed Components: Turbine Bypass Valve (29BPV-4) Actuator Seal. (Parker Fluidpower Rod Seal Kit RK2AHL0405)

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New York Power Michael J. Colomb
Authority Plant Manager

January 14, 1997
JAFP-97-0011

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

Subject: Docket No. 50-333
LICENSEE EVENT REPORT: LER-96-014

Manual Scram Due to Leak in the Main Turbine Electro-
Hydraulic Control System

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73 (a) (2) (iv), "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)".

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Richard A. Plasse, Jr. at (315) 349-6793.

Very truly yours,

MICHAEL J. COLOMB

MJC:RAP:las
Enclosure

cc: USNRC, Region 1
USNRC Resident Inspector
INPO Records Center

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